Magnus has succeeded in arranging for the admission of the Board's scholars to the two principal higher schools of commerce in Paris and to the similar schools in the three Italian towns, Bari, Genoa, and Venice, his suggestions having been most kindly received by M. Bocquet at Paris, and by Signor Fortis, Minister of Industry and Commerce at Rome.

MR. BALFOUR has written a long letter to a constituent in East Manchester on the subject of University education in Ireland. After giving reasons why, in his judgment, the expedient of leaving the one existing teaching University in Ireland—Trinity College—to meet, by a natural process of expansion, the growing educational needs of the country would not be successful, Mr. Balfour suggests that the plan which seems best to solve the University problem, both for the Presbyterians and other Protestants in the north and for Irish Roman Catholics generally. is to establish by a single Act two new teaching Universities—one in Dublin and one in Belfast—on precisely similar lines, and differing in no particular excepting the names of the gentlemen first appointed to serve on their respective governing bodies. As the University in Belfast would absorb the existing Queen's College, the governing body of the new institution should be so constituted as to be a continuation of the old. As the Dublin University is designed to attract those Roman Catholics who now hold aloof from University life altogether, its governing body as first constituted should no doubt, in the main, be of their own way of thinking. A University so constituted would, in Mr Balfour's opinion, meet the need of Roman Catholics, but it would not be a Roman Catholic University, except in the sense that Trinity College and the new University in Belfast would be Protestant, and in that case there would be in Ireland two Protestant Universities to one Roman Catholic.

THE executive council of the County Councils Association passed the following resolutions at a meeting held on January 25: (1) The administrative county (in which term is included the county borough) is *prima facie* to be accepted as the area for secondary education. Nevertheless, provision should be made enabling the council of any county or of any municipal borough to make a representation to the central authority to the effect that it would be desirable, in the best interests of education, that an educational area other than that of the administrative county should be constituted ; and if the central authority, after a local inquiry at which all parties interested may be heard, are of opinion that it will be to the best interests of education that such an area should be constituted, they may make an order accordingly. The central authority should be empowered by such order to make such financial adjustments as they may deem equitable and advisable. (2) That the proposal of the Association of School Boards be not approved, and that the executive council, while thinking it desirable that the new local authorities for secondary education in administrative counties should include members of the governing bodies of elementary schools (both board schools and voluntary schools), consider that this will be better secured by a power of co-optation exercised as is recommended in paragraph 36 of the report of the Royal Commission on Secondary Education than by giving any right of separate representation on the new authorities to school boards, which represent parts only of the administrative county.

PROF. S. W. WILLISTON describes in *Science* a remarkable condition of things which exists in Kansas as to the text-books used in the State schools. He says that at the last biennial session of the Legislature of Kansas there was passed what is known as the State uniform text-book law. A commission was appointed whose duty it was to select the text-books of all grades used in the public schools of the State, which were to be furnished at a stipulated price to all pupils. No other text-book than the one selected may be used by any school under pain of severe penalties. The law has now been in force for two years, and these books are being used by several hundred thousand pupils. It appears, however, that specialists or experts are not consulted in the choice of the text-books. Wide latitude was given to the commission, the one important stipulation being that the books should be cheap ; and the result is that science manuals are used full of unsound and incorrect statements. The principle of specifying text-books might be a good one if the board which examined the books were wise and representative, and contained a fair proportion of practical teachers ; but in Kansas this does not appear to be the case. The School Board of London has a book committee which draws up a list of approved text-books, and a glance at the list is sufficient to show that we need not go to the States for instances of books selected more for cheapness than scientific quality.

SCIENTIFIC SERIALS.

American Journal of Science, January.—The thermodynamic relations of hydrated glass, by C. Barus. During the first or opaque stage of the reaction of hot water on glass at 200° C., volume contraction and increase of compressibility are both marked phenomena. During the second stage the water-glass becomes more and more clear and limpid. Capillary tubes on cooling become rods of brittle water-glass. They always break eventually along their length.—Platinum and iridium in meteoric iron, by J. M. Davison. From 608·6 gr. of Coahuila meteoric iron, 0·014 gr. of metallic platinum were obtained, and 0·0015 gr. of a black powder, which is probably ammonium iridi-chloride. No diamonds were discovered.—Studies in the Cyperaceæ, viii., by T. Holm. This article deals with the root, the rhizome, the aerial stem, and the leaf of some North American species of *Scleria.*—Regnault's calorie, and our knowledge of the specific volumes of steam, by G. P. Starkweather. The writer adduces evidence from Regnault's own experiments to show that his conclusion as to the constancy of the specific heat of water between 0° and 30° is correct. He maintains that all our knowledge concerning the density of steam is limited to the saturation line, the experiments on superheated steam presenting discrepancies which cannot be reconciled.—The estimation of boric acid, by F. A. Gooch and L. C. Jones. The salts are treated with sulphuric acid, and the boric acid is distilled with methyl alcohol, and the distillate evaporated over calcium oxide. In searching for a less hygroscopic material to replace the calcium oxide as a retainer for boric acid, the authors found that sodium tungstate, fused with a slight excess of tungstic acid over that contained in the normal tungstate, answers the purpose excellently.—New Actinians, by A. E. Verrill. Describes a number of new families and genera from Hong Kong, Guadeloupe, Panama, Peru, and San Salvador.—What is the Loess? by F. W. Sardeson. The Loess loam, in combination with land and fresh-water shells, forms a very strong argument in favour of the purely æolian origin of the Loess.—Absorption of gases in a high vacuum, by C. C. Hutchins. The vacuum of Röntgen ray tubes is increased by successive discharges, until it becomes too high for any discharge to pass. This can be prevented by putting some mercuric oxide in a side tube surrounded by a platinum wire heated by a shunt. If a suitable spark gap is inserted in the shunt, the heating may be made automatic. The oxide gives off oxygen when heated, which lowers the vacuum to a proper amount.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, January 27.—Mr. G. Griffith, Vice-President, in the chair.—A mathematical paper was read by Dr. E. H. Barton on the equivalent resistance and inductance of a wire to an oscillatory discharge. Maxwell's treatment of the self-induction of cylindrical conductors was extended by Lord Rayleigh, in an article published in the *Phil. Mag.* for May 1886, to alternate currents that follow the harmonic law at constant amplitude. Dr. Barton now modifies the analysis, and further extends it to include the decaying periodic currents obtained in discharging a condenser, and to the case of damped trains of high-frequency, *i.e.* to Hertz waves in general. The theoretical value (R''/R') for the ratio of equivalent resistances to waves, respectively with and without damping, agrees very well with Dr. Barton's experimental results.—Mr. Oliver Heaviside, in a communication (here abstracted), said that he had by another method of mathematical analysis arrived at the same value as Dr. Barton for (R''/R'). In addition to the causes hitherto suggested as affecting the attenuation factor, it was possible that the conductivity of the wires to vibrations millions per second, might be less than with steady currents, and that the voltage at the beginning of the wave-train might be large enough to cause some leakage. Both resistance and inductance become infinite with infinite damping, and they differ somewhat from the corresponding quantities for undamped waves.—Mr. Rollo Appleyard then described (1) some experiments upon dephlegmators, in which he has attempted to replace the platinum-gauze valves of the ordinary fractionating-tubes by bends in the tubes. The general form of the apparatus consists in a series of elongated bulbs, the top of each being connected to the bottom of the one above it by a horizontal S-shaped tube. The vapour condensed in any intermediate bulb falls back into the preceding S-bend. The first portions of the distillate are thus returned to the boiling-flask, leaving a little at each bend to act as a wash for the ascending vapour. At the early stage of distillation the bulbs and bends behave as required, but it is found that at the later stages certain of the bulbs become completely filled with liquid sustained by the upward pressure of the vapour, and unless the heating is very carefully managed "Geyser" actions may take place. Some arrangement of overflow tubes is therefore required for the bulbs. Mr. Appleyard also exhibited (2) a temperature tell-tale, to be used in connection with vats and for other purposes where an alarm is to be sounded by making electric contact when temperature rises or falls beyond certain limits. A J-shaped glass tube has its short limb sealed and its long limb open. Water or other suitable liquid is poured in, completely filling the short limb. Mercury is then made to displace nearly all the water in the short limb; the surplus water in the long limb is removed by a pipette, and the mercury is adjusted to a convenient level. Two platinum contact-wires are sealed into the glass at a short distance above the free surface of mercury in the long limb. The tube may be half an inch in diameter, with a long limb of 5 inches, and a short limb of 2½ inches. The quantity of mercury in the tube is generally arranged so that at temperatures below the boiling-point of the contained liquid, the mercury level is lowest in the long limb. In this case, if the temperature is raised to the boiling-point of the contained liquid, the mercury assumes approximately a common level in both limbs, for at the boiling-point of the liquid, under these conditions, the vapour-pressure is equal to the barometric pressure. Hence, the liquid and the mercury are not spurted out. Mr. Whopple said that when working with an ordinary "thermometer" tube, the contacts were inefficient owing to oxidation. Moreover the mercury column broke up, and in some cases mercury clung to the contact-wire. He asked if these difficulties occurred in Mr. Appleyard's apparatus. Mr. Watson suggested that in some cases the long limb might with advantage be closed. With regard to the dephlegmator he thought that the bends should each be duplicated by a short tube, so as to provide one path for the descending liquid and another for the ascending vapours. This seemed to be the object of the platinum gauze in fractionating-tubes. Mr. Appleyard, in reply, explained that the change of level in the "tell-tale" was a sudden rise of about an inch of mercury, in a tube half an inch in diameter. This rise was able completely to envelope the contact wires, surface oxidation could not affect the working, and there could be no such thing as failure of contact. Moreover, the tube was too wide for mercury to be held up by capillarity. The large area of contact enabled the instrument to be used for strong currents. The cost was small, and the only adjustment consisted in choosing a liquid of suitable boiling-point; for the platinum wires could be sealed in anywhere in the long limb; about two and a half inches from the bottom was a good position for them. The sudden rise occurred when the temperature was one or two degrees above the boiling-point of the contained liquid.—Mr. T. H. Littlewood then read a paper on the volume-changes which accompany solution, and described an apparatus for measuring the contraction observed when solids are dissolved in a liquid. Two glass bulbs are arranged one above the other, so that liquid can pass from the upper one to the lower one through a stop-cock, and from the lower one upwards into the neck of the upper one through a second stop-cock. This neck, which forms the top of the upper bulb, is fitted with an india-rubber stopper. The lower bulb is tubulured, and provided with a glass stopper. A horizontal capillary tube is fitted into the india-rubber stopper, so that volume changes can be determined, after the manner of using Bunsen's calorimeter. The weighed solid is introduced at the tubulure. The measured amount of water is poured in at the neck. Paraffin oil is now poured in at the tubulure so that the apparatus is completely filled: the lower bulb with the solid and the oil, the upper bulb with the water. The apparatus is then exhausted, and finally it is placed in a tank of water at constant temperature. When the stop-cock between the bulbs is opened, solution begins, and the resulting contraction is measured. For small amounts of salt dissolved in constant volume of liquid, the contraction is very nearly proportional to the amount of salt. For larger amounts, the contraction is greater in proportion than the added salt. If a strong solution is gradually diluted, then for equal amounts of water added, the contraction becomes smaller for successive amounts of added water. Mr. Littlewood applies Ostwald's theory, and the theory of Van der Waals to the observed results, and expresses the contraction as a logarithmic function of the volumes and the internal pressures. Mr. Lehfeldt thought the india-rubber stopper was a weak point in the apparatus. With regard to the theory of the contraction, Tammann (*Zeitschr. für Phys. u. Chem.*, 1895), had given an expression which was rather more intelligible. Tammann found that the effect could be regarded as equivalent to a change of pressure, and by attributing this quality to the solution, the characteristic surface becomes the same as that for water. The volume of the solution would thus follow similar changes to those that water undergoes with increasing pressures. Prof. Ewing said the experiments reminded him of the very first piece of research work he had done in physics, which was twenty-five years ago, on the same problem, with Mr. McGregor. An examination of the electrical properties of solutions of certain salts led to an investigation of their changes of density and volume. In some cases the contraction observed was so great that the volume of the solution was less than the original volume of the water to which the salt had been added. They made some measurements, but the apparatus they had used was very rough compared to that described by Mr. Littlewood. Mr. Watson asked whether Mr. Littlewood had made any simultaneous density measurements. There were some solutions for which the contractions and corresponding densities had been worked out. By examining successive dilutions of strong solutions, and the corresponding densities, a check might be made as to the numerical results obtained by Mr. Littlewood's apparatus. Dr. Chree suggested that in place of the logarithmic expression, the total contraction might possibly be better represented by a few terms of a series involving increasing powers of the difference of volume, each term being multiplied by a proper constant. Mr. Littlewood, in reply, said that the india-rubber stopper possessed advantages in regulating the height of the capillary tube. It did not introduce sensible error, for it was possible to work with it to a centigram of mercury in the capillary. On the other hand temperature-changes of one-tenth of a degree involved one centigram more or less of mercury in the tube. Bunsen, using an india-rubber stopper, obtained very accurate results in calorimetry.

Zoological Society, January 17.—Dr. Albert Günther, F.R.S., Vice-President, in the chair.—Dr. F. P. Moreno exhibited and made remarks upon the original specimen of the recently-described Mammal *Neomylodon listai*, which he believed to be a portion of the skin of one of the old Pampean Mylodons now quite extinct.—Mr. Sclater read some extracts from letters recently received from Mr. J. S. Budgett, who had been sent by the Council on a scientific mission to the Gambia.—Mr. Alfred H. Cocks, exhibited some living specimens of supposed hybrids between the stoat ♂ and ferret ♀.—Mr. R. E. Holding exhibited and made remarks upon some deformed antlers of a fallow deer and of an axis deer. The abnormality in the former was thought to be due to imperfect formation of the "burr," and that of the latter to continued bad health.—Mr. G. E. H. Barrett-Hamilton exhibited some skins of continental squirrels which showed remarkable seasonal changes in coloration, and pointed out their differences from British specimens.—Dr. Arthur Willey gave an account of his itinerary, in the years 1894 to 1897, while in search of the eggs of the pearly nautilus. His travels took him to New Britain, New Hanover, New Guinea, Sydney, New Caledonia, the Loyalty Islands, and elsewhere. In addition to results connected with the main object of the journey, the author described a number of collateral results which were of special interest. These related largely to animals which occupy a low position in the scale of the animal kingdom, and represent vestiges of what were in all probability predominant types in former ages, such as *Balanoglossus*, *Amphioxus*, and *Peripatus*. These creatures were of great interest in respect of their geographical distribution, a subject which was dealt with in the paper. The paper was illustrated by lantern slides portraying some of the author's captures and the methods employed in procuring his material.—Prof. D'Arcy Wentworth Thompson, C.B., read a communication on characteristic points in the cranial osteology of the parrots. The orbital ring, the auditory region, the quadrate bone, and other minor characters were described in about forty genera. *Stringops*, in regard especially to its quadrate bone, seemed to be the most primitive form. *Nestor* was in several respects still more divergent from the rest, though its divergent characters were not necessarily primitive.—A communication was read from Miss Isa L. Hiles, containing a report on the Gorgonacean corals collected by Mr. J. Stanley Gardiner on Funafuti. The collection contained specimens of two new species, viz. *Acamptogorgia spinosa* and *Villegorgia rubra*, and of other species, some of which were of interest as having been described previously only from localities far removed geographically from Funafuti.—A communication was read from Mr. Arthur E. Shipley, containing notes on a collection of Gephyrean worms obtained on Christmas Island by Mr. C. W. Andrews. One species of Echiuroid and five of Sipunculoid worms were treated of in this paper.—A communication was read from Mr. James Yate Johnson, containing notes on the *Coralliidae* of Madeira, and descriptions of two new species, viz. *Pleurocorallium tricolor* and *P. maderense*.

Royal Meteorological Society, January 18.—Mr. F. C. Bayard, President, in the chair.—The Council in their report stated that, owing to the premises now occupied by the Society at 22 Great George Street, being required by the Government, they had been obliged to seek accommodation elsewhere, but not being able to secure offices in the immediate neighbourhood, they had taken a suite of rooms at 70 Victoria Street.—Mr. Bayard, in his presidential address, gave an account of the government meteorological organisations in various parts of the world. He first briefly described the founding of each system, and mentioned the names of the various directors, and then enumerated the number of observing stations associated with each organisation. In most countries forecasts of the weather are issued, and Mr. Bayard gave some interesting particulars as to the success attained by each office. The amount of money voted by the various governments for the support of meteorology showed what a very small portion of the revenue of the different countries goes towards the promotion of this science. In the British Isles it is two shillings and sixpence per square mile, but only about one-third of a farthing per head. The address was illustrated by a large number of lantern slides showing views of the various observatories and portraits of the directors. Mr. Bayard was re-elected president for the ensuing year.

Royal Microscopical Society, January 18.—Annual Meeting.—Mr. E. M. Nelson, President, in the chair.—After the report of the Council for the past year and the Treasurer's statement of accounts had been read and adopted, the President announced that the following were elected as officers and Council for the ensuing year:—President: E. M. Nelson. Vice-Presidents: A. W. Bennett, G. C. Karop, the Hon. Sir Ford North, J. J. Vezey. Treasurer: W. T. Suffolk. Secretaries: Rev. Dr. W. H. Dallinger, Dr. R. G. Hebb. Ordinary Members of Council: J. M. Allen, C. Beck, Dr. R. Braithwaite, Rev. E. Carr, W. Carruthers, T. Comber, E. Dadswell, A. D. Michael, T. H. Powell, C. F. Rousselet, Dr. J. Tatham, Rev. A. G. Warner. Curator: C. F. Rousselet.—The President then delivered the annual address; the first portion was a review of the work of the past year, in the course of which he congratulated the Society on its improved position, the second portion was a paper on dispersion, in which he discussed some formulæ necessary in constructing achromatic lenses; diagrams and tables in illustration of the subject being thrown upon the screen.

Chemical Society, January 19.—Prof. Dewar, President, in the chair.—The following papers were read:—Researches on moorland waters (1), by W. Ackroyd. The author distinguishes between organic and inorganic acidity in moorland waters; their amounts are determined by (1) titration with N/100 alkali, and (2) titration in a sample freed from carbon dioxide by aspiration of air.—Esterification constants of substituted acetic acids, by J. J. Sudborough and L. L. Lloyd. From the authors' experiments it appears that the rate of esterification of an acid depends on the constitution of the acid rather than its strength.—Diortho-substituted benzoic acids. Part iv. Formation of salts from diortho-substituted benzoic acids and different organic bases, by L. L. Lloyd and J. J. Sudborough. The authors are attempting to determine whether the capacity to form salts is dependent on (1) the strength of the acid and of the base, or (2) the constitution of the acid and of the base or on both of these.—α-Ketotetrahydronaphthalene, by F. S. Kipping and A. Hill. Under suitable conditions phenylbutyric chloride is converted by aluminium chloride into α-ketotetrahydronaphthalene by intermolecular condensation.—A new method for preparing unsymmetrical dimethyl- and trimethyl-succinic acids, by W. A. Bone. Ethylic sodiocyanoacetate when heated with alcoholic ethylic α-bromoisobutyrate yields unsymmetrical ethylic dimethylcyanosuccinate $(CO_2Et)CH(CN).CMe_2.CO_2Et$, which on hydrolysis yields the corresponding dimethylsuccinic acid; the sodio-derivative of the dimethylcyanosuccinate yields ethylic trimethylcyanosuccinate with methylic iodide.—Production of optically active mono- and di-alkyloxysuccinic acids from malic and tartaric acids, by T. Purdie and W. Pitkeathly. Alkylation by means of alkylic iodides and silver oxide is generally applicable to the ethereal salts of hydroxy-acids. As racemation does not occur in the process, it is specially adapted for the preparation of optically active compounds.—The action of ammonia on ethereal salts of organic acids, by S. Ruhemann. Ethylic phenylpropenetricarboxylate when treated with ammonia yields ethylic γ-phenyl-$\alpha\alpha'$-dihydroxy-β-carboxylate and phenyldihydroxypyridine; similarly ethylic phenylbenzylglutaconate yields γ-phenyl-β-benzyl-$\alpha\alpha'$-dihydroxypyridine.—The changes of volume due to dilution of aqueous solutions, by E. B. H. Wade.—The thermal effects of dilution, by J. H. Pollok.—Halogen derivatives of acetonedicarboxylic acid; Part i., by F. W. Dootson. Ethylic acetonedicarboxylate is converted by dry chlorine into ethylic tetrachloracetonedicarboxylate.—The detection and determination of sucrose in the presence of lactose, by E. Dowzard. The author determines sucrose in presence of lactose by taking advantage of the fact that sucrose is inverted by citric acid whilst lactose is not.—Note on the interaction of formaldehyde with β-naphthylamine derivatives, by G. T. Morgan.

Geological Society, January 18.—W. Whitaker, F.R.S., President, in the chair.—On a small section of felsitic lavas and tuffs near Conway (North Wales), by Frank Rutley. The rocks described in this communication were collected in 1877, in series, at short intervals, from a point at the mouth of the river Conway, near Bodlondeb. They consist of felsitic lavas and tuffs, sometimes nodular, and generally exhibiting some variety of fluxion-structure, corrugated, or banded. A specimen showing brown bands is compared with one described by Iddings from the Yellowstone Park. What were once possibly red bands are now represented by devitrified brown glass, and the change in colour may have been due to the action of water upon the ferric oxide which originally gave its colour to the glass. Some of the rhyolites are tufaceous, and envelop fragments of rocks, some of which were originally vitreous, others lithoidal. Coarser rhyolitic tuff occurs at the northern end of the series.—The geology of Southern Morocco and the Atlas Mountains, by the late Joseph Thomson. This paper gives the results of observations made under considerable difficulties during a journey in Morocco in 1888. The tract traversed is roughly triangular, the base being the Atlantic Ocean between Saffi and Agadir, and the apex the district of Demnat, on the northern slopes of the Atlas, some sixty miles east of the city of Morocco. This district consists of three main sections: (1) The coast lowlands; (2) the plateau in two chief steps, the northern rising to 2000 and the southern to 5000 feet; (3) the Atlas itself, which only begins to be a mountain-chain about thirty miles from the coast, and which ranges first east-by-north and then north-east in its central and loftiest part. (1) The lowlands are practically conterminous with the Tertiary deposits, among which apparently Eocene, Miocene, and Pliocene rocks are represented. The latter consist of shelly sands 200 to 300 feet thick, gradually rising to a height of 700 feet south and east of Saffi. Their surface is often covered with the slaggy tufaceous crust described by Maw. (2) The plateau is underlain by three rock-formations: (*a*) Metamorphic rocks, including clay-slates, which probably underlie the whole Plain of Morocco, and rise into a group of rugged hills called the "Jebelet," in contradistinction to the "Jebel," or Atlas proper. (*b*) The Lower Cretaceous rocks, consisting of red shales and sandstones, the former frequently giving rise to brine springs and containing salt deposits at Demnat in the Atlas. (*c*) The Upper Cretaceous rocks, chiefly white and cream-coloured limestones, which attain their greatest development on the plateau. (3) The Atlas itself is made up for the most part of the same rocks. There is a core of metamorphic rocks, which is better developed and wider at the western end of the range and narrower towards the east. Next comes the great development of the Lower Cretaceous strata, followed by a diminutive representative of the Upper Cretaceous rocks. These rocks are much broken by folding and faulting, and their structure is displayed in several sections taken across the range from Demnat westward. The first signs of glacial action were met with at Titula, consisting of moraine-like heaps of débris ; elsewhere, scratched stones were found.

Dublin.

Royal Dublin Society, December 21, 1898.—Prof. T. Preston, F.R.S., in the chair.—Mr. J. E. Duerden, of Kingston, Jamaica, communicated a paper giving an anatomical description of ten species (seven Stichodacylinæ and three Zoantheæ) of Jamaican Actiniaria. A new genus, *Heliktanthus*, is erected for the *Actinia anemone* of Ellis, and included along with the genera *Ricordea* and *Actinoporus*, under the family Discosomidæ. Three species of *Parazoanthus* are all new.—Prof. T. Johnson gave an account of the different kinds of peat and their products, including a set of continental specimens recently added to the Botanical Department of the Science and Art Museum, Dublin.—Prof. James Lyon presented a note on the reversal of the photographic image, with lantern illustrations.—Dr. Gerald Molloy read a paper on the use of the vertical wire in Mr. Marconi's system of signalling through space, by means of electric waves. Mr. Marconi had found that by using a long vertical wire in connection with the oscillator at the sending station, and a similar wire in connection with the resonator at the receiving station, he was able to increase the distance over which intelligible signals could be sent, from a few hundred yards to fourteen miles and more. But the curious thing was that the wire was quite ineffective if placed horizontally. To account for this, Dr. Molloy proposed a theory, founded on the principle of electric images. He showed that, whether the wire was placed horizontally or vertically, the oscillations of the discharge were accompanied by oscillations of the electric image, and that each set of oscillations sent out waves into space. But there was this difference between the two cases : when the wire was horizontal, the waves sent out by the oscillations of the image were in opposite phase to those sent out by the oscillations of the discharge, and therefore tended to extinguish them ; whereas when the wire was vertical, the two sets of oscillations were in the same phase, and tended to reinforce each other.—Mr. Ernest A. W. Henley presented a preliminary note of a method of measuring the relative opacities of various organic substances to the X-rays. He found the numbers representing the relative opacities of bone, muscle, and fat to be 4, 2·5, and 1. These results were obtained by comparing X-ray photographs of wedge-shaped pieces of the substances placed side by side, and finding two points, one in each wedge, which had the same depth of colour. The thickness of each wedge at the point found in it was measured, and hence the ratio of the opacities was determined.—Prof. G. F. Fitzgerald, F.R.S., read a paper on a hydrodynamical hypothesis as to electromagnetic actions The paper is an attempt to extend Lord Kelvin's papers on the propagation of laminar motion in a turbulent liquid in the *Phil. Mag.*, 1887, vol. xxiv. p. 342, and which he there illustrated by separate vortex rings in the case of long vortex filaments, such as Lord Kelvin described in a paper on vortex filaments surrounded by a tore (*R. I. Acad. Proc.*, ser. iii., 1889, vol. i. p. 340). It appears as if electric force should be represented by a helical condition of the filaments, which would be propagated with another accompanying motion which represents magnetic force. An electron should then be the irregular point where two helices wound in opposite directions meet.

Paris.

Academy of Sciences, January 23.—M. van Tieghem in the chair.—Some remarks on the prolongation of functions, by M. Emile Picard.—On some properties of aluminium, by M. A. Ditte. The results of experiments on the corrosion of aluminium by saline solutions show that the metal is at first vigorously attacked, but that a coherent protective layer of alumina is soon formed. In presence of air, however, the corrosion goes on, and if an aluminium plate has been immersed in a salt solution and then only imperfectly washed, the attack slowly continues, the surface becoming more easily attacked by other reagents.—Histology of the skin. Some histo-chemical reaction of eleidine, by M. L. Ranvier. The fragment of skin is left for ten hours in a ten per cent. solution of common salt, then hardened in alcohol, and the sections stained with picrocarmine. A uniform red tint is observed at the level of the *stratum granulosum*, the granules of eleidine being completely diffused. In this way it can be shown that the epidermal cells lose their granular eleidine sharply in passing from the *stratum granulosum* into the *stratum intermedium*.—On the formation of pollen and the chromatic reduction in *Nais major*, by M. L. Guignard. The numerical reduction appears only at the instant when the pollen mother-cell commences to divide up into the four pollen grains. During the first division of the mother-cell, each chromosome splits twice longitudinally and becomes quadruple ; during the second division, the our chromosomes already formed are simply distributed equally between the four pollen nuclei.—Researches on the chemical state of the elements contained in steels. Double carbides of iron and other metals, by MM. Ad. Carnot and Goutal. The carbides $Fe_3C.WC.$, $Fe_3C.Mo_2C$, $2Fe_3C.Mn_3C$, $.Fe_3C.2Mn_3C$, and $Fe_3C.4Mn_3C$ were isolated from steels containing tungsten, molybdenum, and manganese. — The first voyage of the *Princess Alice II.*, by Prince Albert I. of Monaco. A *résumé* of the scientific results of the voyage in the polar seas during the summer of 1898. The majority of the specimens were collected in the northern Norwegian fjords and at Spitsbergen.—Prof. Mendelejeff was elected correspondant in the Section of Chemistry, in the place of the late Prof. Kékulé.—Observation of the total eclipse of the moon of December 27, 1898, made at the Observatory of Besançon, by M. L. J. Gruey.—Observations of the planet 1898 ED (Charlois), and of the Chase comet, made at the Observatory of Besançon, by M. P. Chofardet, by M. L. J. Gruey.—On some photographs of nebulæ and star clusters, obtained at the Observatory of Meudon, by M. Louis Rabourdin. The paper is accompanied by seven reproductions of photographs of nebulæ and of the great Hercules star cluster.—Generalisation of Jacobi's first method of integrating partial differential equations, by M. N. Saltykow.—On groups of operations, by M. G. A. Miller.—On the development of certain surds in continued fractions, by M. Crelier.—On the deformation of some quadrics of revolution, by M. C. Guichard.—On the normal equation of surfaces, by M. A. Pellet.—On the expression of the energy of a circuit and the law of the electromagnet, by M. A. Perot.—On the chemical action of the X-rays, by M. P. Villard.—Action of oxidising agents on some aromatic compounds, by MM. Œchsner de Coninck and A. Combe. A continuation of work previously described. Nitrogen gas was evolved on oxidation with chromic acid in only one case, that of picramic acid.—Action of iodine monochloride upon monochlorobenzene in presence of anhydrous aluminium chloride, by M. A. Mouneyrat. Iodine monochloride acts readily upon chlorobenzene in presence of aluminium chloride at 60° C. The main product of the reaction is *p*-iodochlorobenzene, small quantities of dichlorobenzene and trichlorobenzene being obtained as bye-products.—Studies in filtration ; organic liquids, by M. J. Hausser. The filtering layer in these experiments was composed either of kaolin, calcium phosphate, or animal charcoal. The filtering layer was not changed by the successive passage of different liquids. The relative velocities of filtration for a given liquid are not altered by a change in the filtering material.—Biochemical oxidation of propane glycol, by M. André Kling. Propane glycol is oxidised by the sorbose bacteria to either acetol or pyruvic aldehyde, the osazone of which was isolated.—On some cellular bodies in the organism of a vertebrate, by M. P. Stephan.—Researches on the anal glands of the *Carabidae*, by M. L. Bordas.—On the mechanism of flight in insects, by M. Charles Janet.—Relations between the intensity of the green coloration of leaves and assimilation by chlorophyll, by M. Ed. Griffon. It is not always possible to predict the intensity of chlorophyllian assimilation by the intensity of the green coloration in fully-developed leaves. In some cases leaves having the same tint have different assimilating powers, and in others the pale leaves may assimilate more strongly than the darker leaves.—On the primordial leaves in *Cupressus*, by M. Aug. Daguillon.—On the structure of the bundles of the placenta in the genus *Primula*, by M. E. Decrock.